Michigan Inland Lakes
Proactive vs. Reactive

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Airmax
There are an estimated **11,000** Inland Lakes in the state of Michigan.
Use of Earth Bottom Lakes:

- Recreation — Fishing, Swimming
- Water Retention
- Fire Suppression
- Decorative
- Irrigation
- Livestock Watering
A Lake’s Life Cycle can be broken into two stages:

Stage 1

1. Organic matter from plants, birds, animals & debris begin to accumulate in your lake.

2. The nutrient load is low resulting in minimal weed and algae growth.

**Usually lasts 3-5 years**
The Aging Process of A Lake

During Stage 2

• Excessive algae blooms and pond weeds become noticeable

• Emergent plants, such as grasses and cattails, begin growing around your pond’s edge.

• Usually a chemical application is needed to gain control.
Lake’s Goal is to be a Grassy Marsh or Meadow
How much Oxygen is Required For A Healthy Aquatic Habitat?

5mg/l or parts per million
How Much Oxygen is Required?
Reactive (Post Emergent) Lake Management Practices

- Algaecides - Copper Sulfate
- Herbicides – Glyphosate, Floridone, Diquat
- Lake Dyes
- Mechanical – Cutting, Dredging
- Aeration
Reactive

Downside of Reactive (Post Emergent) Pond Management Practices

- Temporary fix
- Addiction to chemicals
- High long-term costs
- Fish Kills
Reactive

Reactive (Post Emergent) Pond Management Consequences

- Massive plant death/Oxygen depletion
- Organic build-up
- Nutrient build-up
- Massive plant build-up
- Exponential aging of the lake or pond
Massive Plant Build-up
Aging Syndrome
Addiction to Chemicals
How Is Aeration Achieved In Lakes & Ponds?

• **Naturally:** Wind, Rain, Natural Water Falls, Plants

• **Mechanically:** Diffused Aeration, Fountains, Fountain Aerators, Wind Mills, Motorized Boats, Mechanical Water Falls
Natural Forms of Aeration

- Wind Currents
- Plant Life Through Photosynthesis
- River and Streams
Mechanical Form - Bottom Aeration

• Most Economical – Cost (Maintenance & Electrical)

• Natural & Serene Look

• 3 Components to Bottom Aeration:
  
  Compressor and a Cabinet
  
  Diffuser (Key Component)
  
  Weighted Airline
PRO-active Water Management Approach

- Aeration – Sub-surface
- Bacteria - Natural alternatives to chemical Treatments.
- Good for the Environment
Sub-Surface Aeration:

Why is it needed?

- Water Circulation – Increases
- Oxygen Levels...
Sub-Surface Aeration:

**Why is it needed?**

- Promotes a Working Ecosystem
- Boosts Microbial Activity, helping create a clearer, cleaner, healthier pond.
- Helps minimize bottom muck.
Sub-Surface Aeration:

Why is it needed?

- Reduces Fish Kills Caused by Oxygen Depletion
- Eliminates Turnover by Eliminating Thermal Stratification
- Encourages a Stronger, More Productive Fish Population
What is a Thermal Stratification?

1. Temperature variance from surface to the bottom

2. The surface is where most plant production occurs preventing oxygen created by waves to trans-locate to the bottom

3. Heavier denser water is low or devoid of oxygen promoting release of nutrients

4. Diurnal thermal inversions can kill fish as layers of water low in oxygen shift locations
What’s Going On Underwater?

- Air is pumped to the diffuser
- Millions of small synergistic bubbles rise at a rate of 1 ft/sec entraining water 360 degrees around the bubble column
- Lift the low oxygen water to the surface at a rate of 4,500 GPM!
Mud-Water Interface

• The mud-water interface is located on the pond bottom and is composed of mud and "ooze". This is the area where water mixes with ooze. This substance has no texture and is composed of hydrogen sulfide and carbon dioxide (smelly toxic gases).

• By aerating this area of the pond, the toxic gases are removed, thereby increasing the habitat and health conditions for the fish. Nutrients that feed problematic algae and aquatic weeds are bonded to the pond bottom sediments, thus rendering them inactive. The results are a reduction in algae and weeds due to a starving of the food source.
Key Points about Bacteria

• Heterotrophic bacteria are considered to be organic sludge degraders.

• Heterotrophic bacteria are facultative anaerobes; meaning they can function with or without oxygen.

• Heterotrophic bacteria perform completely different functions depending on the level of DO present.
Key Points about Bacteria

• Heterotrophic “nitrifiers” can also operate in the reverse direction; that is they can convert nitrate into nitrite or ammonia where DO are very low.

• Bacteria do not require light to live, in fact UV is used to kill bacteria. Dye is a benefit to the bacteria process when applied to the pond or lake.
The Relationship between Algae and Bacteria

- Bacteria have a much greater surface area to volume ratio than algae which increases the uptake of nutrients allowing the bacteria to out-compete algae for nutrients

- Heterotrophic bacteria double their population within 20min, algae take 24 hrs
Proactive Results
Massive Plant Build-up
Proactive Results
Bad Waters Gone Good

PRO-Active Results
Bad Waters Gone Good

Aging Syndrome
Bad Waters Gone Good

PRO-Active Results
Can I Treat a Specific Area?

Yes You Can!
Sanford Lake, MI